

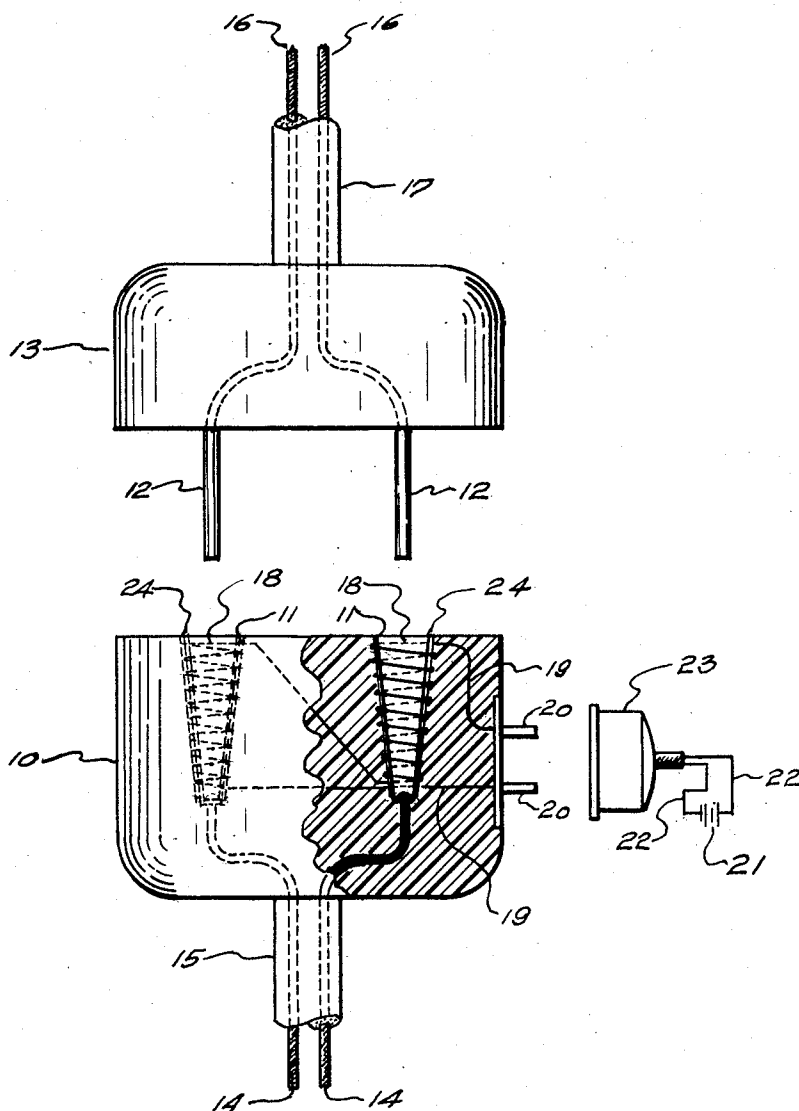
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ELECTRIC CABLE CONNECTOR WITH SOLDERED JOINTS

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ELECTRIC CABLE CONNECTOR WITH SOLDERED JOINTS

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The invention described herein may be manufactured and used by or for the Government of the United States of America for governmental purposes without the payment of any royalties thereon or therefor.

The present invention relates to electrical connectors and more particularly to the electrical connectors of the plug type which may be readily soldered and unsoldered.

Electrical connectors of the plug type, i. e., those in which the electrical connection between the male and female members depends upon pressure contact are very convenient and are widely used wherever frequent connection and disconnection is desired. In many installations where the convenience of a plug type connector is desired they are not too satisfactory for the reason that the contact surfaces corrode, are bent out of shape, or otherwise rendered inefficient in completing an electrical connection. In many installations such as on combat vessels where reliability is extremely important the convenience of the plug type connector must yield to a different type unless it is provided with greater reliability.

In accordance with the present invention the convenience of the plug type connector is substantially retained along with the reliability of a soldered connection. In its preferred form this is accomplished by providing the contact socket terminals of the female plug portion of the connector with built-in heating coils arranged in heat exchange relationship with the socket terminals, the arrangement being such that by passing a current through the heating coils solder placed in the socket terminals will be melted at which time the mating prong type terminals can be pressed home so that when the heating current is removed the solder solidifies to provide a reliable soldered connection. When it is desired to disconnect this plug a temporary heating current is again applied to the heating coils and when the solder softens the two members of the plug can be separated. While the requirement of auxiliary power and the added time required for making and breaking connections in accordance with the invention impose certain limitations upon the convenience provided by a simple contact type plug connector, these limitations become quite acceptable under conditions where the reliability of the connection is more important than its speed of making and breaking.

The primary object of the present invention is to provide a plug type connector having the reliability and conductivity of a soldered connection.

Another object of the invention is the provision of a solderable connector which requires for its making and breaking no special equipment other than an auxiliary source of electrical power such as is usually available where such connectors are employed.

Other objects and advantages of the invention as well as the invention itself will be readily understood from the following description when read in connection with the accompanying drawing, the single figure of which is an exploded view in side elevation partly in section of a plug type connector incorporating the invention.

As here shown a female plug member 10 is provided

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with socket terminals 11 adapted to receive the prongs 12 of a male plug member 13. The socket terminals 11 are electrically connected to wires 14 of a cable 15 which is to be connected to the wires 16 of a cable 17 through the prongs 12. In accordance with the invention each of the socket terminals 11 has associated therewith a heating coil 18 which may be, as shown, connected in series with lead wires 19 which are made accessible to the exterior of the plug member 10 in any suitable manner as by terminating in contact members 20. The plug member 10 with its several inserts is preferably cast or molded with a suitable thermosetting plastic such as, for example, a mica filled phenol formaldehyde. When a connection is to be made the proper amount of solder, if not already present, is placed in each of the socket terminals 11 and electric power applied to the heating coils 18 from any suitable source, here shown as being a battery 21, through leads 22 and a plug 23 which when pressed to its home position on the contacts 20 places the battery 21 in series with the heating coils 18 to melt the solder. When the solder in the socket terminals 11 is fluid enough the prong type terminals 12 are inserted therein and the battery 21 disconnected from the coils 18 by uncoupling the plug 23. If the volume of the solder in each socket terminal 11 has a volume equal to the difference volume between a socket terminal 11 and the prong terminal 12, the level of the solder will exactly fill the socket terminals 11 to provide the optimum electrical connection between the two mating terminals 11 and 12. Adequate electrical connection between the cooperating terminals 11 and 12 does not require the solder to completely fill the socket terminal in connected position, and in practice it is preferred to use somewhat less than the optimum amount as a safety factor to prevent any overflow of solder which might short circuit the connection. This safety factor can be improved by shaping the socket terminals so that their cross section decreases with depth such as would be provided by an inverted frustum of a cone, as illustrated, to the end that the factor of safety against overflow is proportionally larger than the decrease in the axial length of the solder connection.

The heating coils 18 are preferably more closely wound than indicated in the drawing and are insulated from the socket terminals 11 in any suitable manner as for example by covering the outer surface of the socket terminal 11 with a thin walled conical sleeve 24 of insulating material which may be molded from mica flakes as is well known.

It will be evident from the foregoing description that the present invention provides a plug type connector the conductivity of which remains substantially constant and can thus be used in circuitry where sensitivity and performance are greatly influenced and easily degraded by very slight changes in conductivity somewhere in the circuit.

While for the purpose of disclosing the invention a single embodiment has been described in detail it is to be understood that the invention is not limited thereto but may be incorporated in many different forms as well as in connectors for cables having more than two conductors.

What is claimed is:

1. An electrical connector for receiving a prong type terminal comprising a female plug member of electrical insulating material and having at least one socket terminal adapted to be partially filled with solder, a cable wire electrically connected to the socket terminal, a heating coil within the plug member in heat exchange relationship with and electrically insulated from the socket terminal, and lead wires from the heating coil accessible to the exterior of the female plug member, whereby the

temporary application of an electric voltage across the lead wires will energize the heating coil to apply solder melting heat to the socket terminal so that a prong type terminal may be inserted therein or removed therefrom.

2. The electrical connector described in claim 1 wherein the cross section and volume of the socket terminal are substantially larger than the cross section and volume of the prong terminal to be inserted therein, whereby when the socket terminal contains solder whose volume equals the volume difference between the socket terminal and the prong terminal, the socket terminal will be filled when the solder is melted and the prong terminal inserted therein.

3. The electrical connector described in claim 2 wherein the socket terminal decreases in cross section with depth so that a decrease in the volume of solder present does not correspondingly decrease the axial length of the soldered connection.

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